Claims

We claim:

1. A nanopore structure with nanopore for sensing a nanoscale moiety having a quencher molecule, comprising:
(a) a substrate having a nanopore;
(b) an excitable molecule attached to the substrate adjacent to the nanopore;
(c) a light source for exciting the excitable molecule attached to the substrate adjacent to the nanopore, said light source for producing a first excitation signal from said excitable molecule that may be modulated by a quencher molecule comprising a portion of said biopolymer as said biopolymer translocates through said nanopore of said substrate; and
(d) a detector adjacent to said substrate and nanopore for detecting the signal modulation changes of said excitable molecule as said quencher molecules are moved adjacent to said excitable molecules.

2. A nanopore structure as recited in claim 1, wherein the light source comprises a laser.

3. A nanopore structure as recited in claim 1, wherein the light source comprises a light pipe.

4. A nanopore structure as recited in claim 1, wherein the excitable molecule on the is selected from the group consisting of an ion, a monomer, an atom, a metal, a halide, an amino acid, a nucleotide, a simple sugar, a quantum dot, and a nanosphere.

5. A nanopore structure as recited in claim 1, wherein the nanoscale moiety comprises a biopolymer.

6. A nanopore structure as recited in claim 3, wherein the biopolymer is selected from the group consisting of a polypeptide, a polynucleotide, a synthetic polymer, a non synthetic polymer and a polysaccharide.

7. A nanopore structure as recited in claim 4, wherein the polynucleotide is selected from the group consisting of deoxyribonucleic acid (DNA), ribonucleic acid (RNA), single stranded DNA, single stranded RNA, double stranded RNA, double stranded DNA, DNA complexed to RNA, DNA bound to protein, RNA bound to protein, transfer RNA (tRNA), and messenger RNA (mRNA).

8. A nanopore structure as recited in claim 1, wherein the nanopore is from 1 nanometer to 10 nanometers in diameter.

9. A nanopore structure as recited in claim 1, wherein the excitable molecule comprises a chromophore.

10. A nanopore structure as recited in claim 1, wherein the excitable molecule comprises a fluorophore.

11. A nanopore structure as recited in claim 9, wherein the fluorophore is selected from the group consisting of an aromatic amino acid, a nucleic acid, a derivatized nucleic acid, fluorescein, a quantum dot and coumarin.

12. A nanopore structure as recited in claim 1, wherein the quencher molecule is selected from the group consisting of cesium chloride, potassium iodide, quinaldic acid, acrylamide, pyridine, 8-anilinonaphthalene-1-sulfonate (ANS),

13. A method for sensing a portion of a nanoscale moiety, comprising:

(a) providing a substrate having an excitable molecule adjacent to a nanopore; and

(b) moving a portion of a nanoscale moiety with a quencher molecule past the excitable molecule to quench the excitable molecule and determine the identity of the portion of the nanoscale moiety.

14. A method for sensing a portion of a nanoscale moiety, comprising:

(a) providing a substrate having an excitable molecule adjacent to a nanopore;

(b) exciting the excitable molecule;

(c) moving a portion of the nanoscale moiety with a quencher molecule past the excitable molecule to quench the quencher molecule and determine the identity of the portion of the nanoscale moiety.